Asset allocation, stock selection and interaction effects: Study of concept of performance attribution in equity mutual funds

Chetna Vashisht[1]
Mohit Gupta[2]

Abstract

Most of the research carried out in the sphere of mutual fund portfolio performance pertains to studying of return and risk measures. The empirical and conceptual research has paid little attention to the concept of performance attribution. The subject of performance attribution helps the analyst to arrive at the various attributes of the excess portfolio return. The main attributes being stock selection and asset allocation guides the analyst into predictability of future returns and ratings of the mutual fund portfolios. This paper highlights the concept of performance attribution, the methodology used by two of the most important performance attribution models namely BHB model and Brinson Fachler model. The paper also discusses the different approaches used for performance attributes like arithmetic or geometric and the periodicity effects in carrying out attribution for multi-periods. The paper limits its discussion to performance attribution of equity portfolios only.

1 PhD student, School of Business Studies, Punjab Agricultural University, Ludhiana.

2 Assistant Professor, School of Business Studies, Punjab Agricultural University, Ludhiana

Introduction

Mutual fund performance is one of the most widely addressed, cited and reported issues in mutual fund literature. From the earliest works on stand alone performance evaluation to multi-variate analysis of the issues that influence performance, this issue has seen a great evolution. Authors have shown wider interest not only in measuring the mutual fund performance, developing newer and better models of performance measurement, benchmarking, developing alternative benchmarks, but also in various factors that influence performance. At present interest of the researchers lies in developing Bayesian models (which incorporates prior beliefs about future returns) of performance measurement. Closely related to the issue of mutual fund performance are the issues of mutual fund performance persistence and fund managers' market timing and stock selection abilities.

Modern finance theory rests on the assumption that purchase decision for individual financial assets should be made on the basis of investors' anticipation regarding the future returns and risk of the asset and the covariance of these returns with other financial assets in investor's portfolio (Markowitz, 1959; Elton & Gruber, 2001). In view of this, most of the research on mutual fund selection and thereby purchase extensively used only two explanatory variables namely return and risk performance. Post the development of portfolio theory, various measures of mutual fund performance have been developed (for example Treynor,1965; Sharpe,1966; Jensen,1968; Fama,1972 etc). The results of the mutual fund performance (relative

to the broader market or the benchmark selected) have been found to be largely mixed. Although there are some studies which indicate that mutual funds under perform the market (for example Sharpe, 1966; Jensen, 1968) yet there are others which indicate otherwise (for example Ippolito, 1989; Grinblatt & Titman, 1989a). The idea whether historical performance is indicative of future performance (performance persistence) has been extensively studied and reported in mutual fund literature. Here again, mixed results and observations have been found. Some studies do find persistence in performance (for example Lehman & Modest, 1987; Ippolito, 1989 etc) yet there are others which indicate either no persistence or persistence of inferior performance (for example Shukla & Trzcinka, 1994). Almost similar results have been found in Indian mutual fund industry (for example Chakarbarti & Rungta, 2000; Singla & Singh, 2000).

Especially with regard to mutual fund measurement of portfolio performance is an important goal both for investors and fund managers. It helps the clients by providing important information about the results of investment decision. Performance of portfolio manager is evaluated on the basis of difference between the portfolio return and benchmark return. The difference between portfolio return and benchmark return is called active return. The active return may be due to asset allocation or stock selection ability of mutual fund manager. This also includes the interaction effect between asset allocation and stock selection. This paper highlights the concept of performance attribution which helps the analysts to arrive at the various attributes of the excess portfolio return. According to Bacon (2002) performance attribution is defined as a technique used to quantify the excess returns of portfolio against its benchmark into the active decisions of the investment decision process. Attribution can be classified into two components – absolute attribution and relative attribution. Absolute attribution refers to total portfolio returns and relative attribution refers to excess returns but normally the concept of performance attribution is referred to excess returns. Fund manager takes two types of investment decision i.e. asset allocation decision and stock selection decision whether they are adopting top-down approach or bottom up approach. These approaches are based on two-factor model and three-factor model. In two-factor model active return is deconstructed into weighting and selection effect while in three-factor model is decomposed into weighting , selection and interaction effect. Top-down approach is more suitable in taking asset allocation decisions where as bottom-up is more appropriately used in case of stock selection.

Asset allocation is the ability of a manager to allocate the asset in different sectors. Fund manager overweight or underweight of any sector in the fund, relative to the scheme benchmark is referred to an asset allocation decision. Allocation is said to be positive if fund manager overweight of any sector which has outperformed than benchmark or underweight of any sector which has underperformed than its benchmark and it is said to be negative if fund managers' overweight any of sector which has outperformed relative to its benchmark or underweight in a sector that has outperformed than its benchmark. Stock selection effect represents the managerial skills at picking better securities than the benchmark. Selection is said to be positive if manager gives more weight to the security which has performed well and it can be negative if manager give less weight to any of security which has outperformed than a benchmark. Performance attribution methodology evaluates these decisions of fund manager. The two most popular models for equity attribution are Brinson Hood Beebower model or BHB model (Brinson et al 1986) and Brinson Fachler model commonly known as BF model (Brinson and Fachler 1985). According to BHB model, entire portfolio returns comer from contribution of benchmark return,

asset allocation effect, stock selection effect and interaction effect. Interaction effect includes both the allocation effect and selection effect. Researchers have formed consensus in their approach towards treatment of interaction effect as many of them advocate that the interaction effect can be included with selection effect (for example see Laker 2000, Campisi 2004, Spaulding 2008). The difference between BHB and BF model concerns with the treatment of allocation effect as BF model treats the allocation decision on relative basis to the overall benchmark, the approach which is preferred by most of the fund managers (TSG 2007). Performance attribution models are used by majority of academicians and fund managers for evaluation of portfolio performance determinants.

The attribution approach can be implemented using arithmetic or geometric method and further the attribution analysis can be done for a single period or multi-period. The arithmetic method works best in the single period and can be simply calculated by doing subtractions when returns are compared and additions when it is concerned with the total effects at various levels. Normally this method is intuitive in nature. For single period analysis top-down approach is more appropriately used and it serve as a foundation for multi-period attribution while bottom-up approach is used for that investment process which focuses on stock selection and in which weighting effect is secondary. Additional smoothing is required to apply in the multi-period setting (Bacon 2002). The geometric method (for example see Allen 1991, Bain 1996, and Bacon 2002) takes the geometric differences by translating returns into return relatives. Geometric method has a merit of theoretical and mathematical soundness (Bacon 2002). It measure the effect of particular investment decision and effect is divided into different components which provide insight about overall decision .For multi-period analysis, smoothing is required and a variety of smoothing techniques have been developed to achieve the purpose like Carino Smoothing (Carino 1999); Manchero Smoothing (Manchero 2000); Frongello Linking Algorithm (Frongello 2002); Davies and Laker method (Davies and Laker 2001).

Holding based performance attribution models came into picture with the efforts of Brinson and Fachler (1985) who first carried out performance attribution of non US equity portfolios and also established the correct benchmark index for measuring the performance of non US equity portfolios. The study divided active return of portfolios into three components namely – asset allocation effect, stock selection effect and interaction effect. The study emphasized on calculation of asset allocation and observed that allocation effect is to be calculated by multiplying the weighting difference by the benchmark sectors relative return where the sectors return is relative to overall benchmark return. A year later, Brinson et al (1986) focused on the impact of different determinants namely investment policy, market timing and stock selection on the magnitude variability of total portfolio returns. The study used sample of 91 pension plans and analyzed quarterly data for 10 year period from1974-83. Policy return which represents return related to benchmark return, timing return, stock selection return and actual portfolio returns were used as different quadrants in the study. It was found that decisions related to include or exclude asset classes and their long term weights based on investment policy determine return and were named as market timing and stock selection decisions. Both of the models are now commonly known as Brinson models and are very famous among academicians and fund managers (TSG 2007). The update to BHB model was proposed by Brinson et al (1991) wherein the researchers highlighted the various determinants related to the investment management process named as asset allocation policy, active allocation and security

selection with respect to the total returns of investment portfolios. Study used 10 year quarterly data period from 1977-87 of 82 large pension plans and proved that the asset allocation policy is the most powerful contributor to total return. These results have increased the importance of benchmark in portfolio attribution methodology (Bailey 2001).

The determinants of performance or performance attributes per se may present distorted picture (Ankrim 1992, Binay 2005) and the risk distortion could amount to 160 to 240 basis points in a year (Ankrim 1992) so it is commonly suggested that a simple risk adjustment procedure should be adopted by the manager while choosing the portfolios in which risk level differ from their respective benchmarks so that it can compensate for the distortion of attributes. With presence of risk and therefore attribute distortion, there may be penalty on information regarding some of the investing choices in decision process taken up by the fund manager (Phillepe 2005). Therefore it is proposed to take risk into account which is mainly the relative risk as measured by standard deviation of tracking error. By taking risk into account it was considered possible to justify the choices without any penalty. Binay (2005) also examined the risk adjusted performance of equity investment performance of US institutional investors. For this purpose quarterly based portfolio holdings were taken into account from the period 1981-2002 which showed that institutional investors not only excelled at stock selection but also successfully managed the client asset and observed the remarkable performance in generation of excess returns during the period. The study found that style choice was the main determinant for the overall portfolio performance. Several researchers have applied BHB model (for example French 2003) who examined the total return of five model mutual fund portfolios over the three year period and analyzed the contributions of strategic asset allocation, tactical timing and security selection effects. Study demonstrated that strategic asset allocation policy explained more than 90% of variation in total portfolio return. The study also considered risk adjusted return and demonstrated that the results obtained vis-à-vis total returns also apply on a risk adjusted return basis. Several other researchers have also applied Brinson and Fachler model (for example Gyger 2005). These models have been applied for single periods or multiple periods (Gyger 2005) using both arithmetic and geometric methods (Wong 2004, Gyger 2005). Although arithmetic method is known to be easily understandable but its results are interpreted to be inconsistent and distorted as compared to geometric which is known to be more consistent, especially for multiperiod analysis, because of its compound factor. Some of the researchers used both arithmetic and geometric methods (for example Wong 2004). There are even attempts to use pooled regression model by incorporating all portfolios together as compared to individual examination of each portfolio (French 2003).

The results of performance attribution models are mixed as in one of the study by Hensel et al (1991) and in another study by Brooks and Porter (2012) the researchers evaluated the performance of 2000 equity funds managed by equity managers over the 12- year sample period covered from 1994-2005 in terms of their sector allocation and stock selection skills with the help of attribution analysis. The results indicated that the equity managers have been successful at sector allocation and stock selection during the bear market of 2000-02 and actively managed fund returns exceeded returns from passive portfolios. In another study by Lu and Kane (2013) the performance attribution of equity portfolio was determined using Brinson models by taking 200 stocks under equal weighted portfolio and found aggregate returns in the form of allocation effect (-0.14%), selection effect (1.42%), interaction effect (0.19%) and active return (1.42%). In

nutshell, past studies do not present any clear trend regarding dominance of any performance attribute but do point towards vast dispersion of returns among various attributes. (For example see Higgs and Goode, 1993). Hensel et al (1991) measured the impact of different decisions relating to asset allocation, security selection and market timing on the returns of pension fund and made a comparison between portfolio actual return with hypothetical portfolio that asset allocation was considered the decision with a strong influence on a pension fund return. Hsu et al (2008) highlighted on the concept of generalized attribution and ability of fund manager to time the market was considered to be more desirable for value addition. It emphasized on decomposition of allocation effect into static and dynamic source for value addition. It was found that sources from dynamic factor cannot be duplicated and more valuable than static sourced of value addition. The results are applicable not only to equity market but also to bond market as in according to the study by Andreu and Swinkels (2009) the performance of balanced pension plan Spanish balanced pension plans were evaluated. Managerial skills based on selection ability, market timing ability was evaluated with the help of multifactor timing model for equity and bond markets. The results indicated positive bond timing ability but average timing ability in case of equity market.

Conclusion: Mutual fund sector around the world offer plethora of schemes to the investors. The investors mostly rely on portfolio performance with respect to risk and return of the scheme but pay little attention to the attributes. The subject of performance attribution provides the ability to assess the relative contribution of these attributes namely asset allocation and stock selection using Brinson Hood Beebower model or BHB model (Brinson et al 1986) and Brinson Fachler model (Brinson and Fachler 1985). This paper discusses the review pertaining to performance attribution, assessment of various attributes and the related studies.

References:

Allen G C (1991) Performance attribution for global equity portfolios. Journal Portfolio Management 18:59-65.

Andreu L and Swinkels L (2009) Performance evaluation of balanced pension plans. Quantitative Finance 12:819-30.

Ankrim EM (1992) Risk adjusted performance attribution. Financial Analyst Journal 48:75-82.

Bacon C R (2002) Excess returns-Arithmetic or geometric. Journal Performance Measurement 6:23-31.

Bailey J V (2001) Benchmark and attribution analysis for the total fund. AIMR Conference Proceedings. Pp 28-37. Association for Investment and Research, Charlottesville, USA.

Bain W G (1996) Investment performance measurement. Pp 23-32.Woodhead Publishing Limited, London

Binay M (2005) Performance attribution of US institutional investors. Financial Management 34:127-52.

Brinson G P, Hood L R and Beebower G L (1986) Determinants of portfolio performance. Financial Analyst Journal 42:39-44.

Brinson G P, Singer B D and Beebower G L (1991) Determinants of portfolio performance II: An update. Financial Analyst Journal 47:40-8.

Brison G P and Fachler N (1985) Measuring non- US equity portfolio performance. Journal Portfolio Management 12:73-6.

Brooks L R D and Porter G E (2012) Mutual fund performance attribution. Financial Services Review 21:259-67.

Campisi S (2004) Debunking the interaction myth. Journal Performance Measurement 8:63-70.

Carino D R (1999) Combining attribution effects over time. Journal Performance Measurement 3:5-14.

Chakarbarti A & Rungta H (2000) Mutual fund industry in India: An indepth look into the problems of credibility, risk and brand. The ICFAI Journal of Applied Finance 6:27-45.

Davies O and Laker D (2001) Multiple-period performance attribution using the Brinson model. Journal Performance Measurement 6:12-22.

Elton E J and Gruber M J (2001) Modern portfolio theory and investment analysis (5th edn.). Pp 35-36. John Wiley and Sons, Singapore.

Fama E F (1972) Components of investment performance. The Journal of Finance 27:551-67.

French C W (2003) Another look at the determinants of portfolio performance: Return attribution for the individual investor. Retrieved on 12th Sept, 2013 from http://ssrn.com/abstract=706603.

Frongello A S B (2002) Linking single period attribution results. Journal Performance Measurement 6:12-22.

Grinblatt M and Titman S (1989a) Mutual fund performance: An analysis of Quarterly portfolio holding. The Journal of Business 62:393-416.

Gyger S (2005) Multi-period performance attribution: A refreshing perspective. Retrieved on 12th Sept, 2003 from http://ssrn.com/abstract=861844.

Hensel C R, Ezra D D and Iikiw J H (1991) Importance of asset allocation decision. Financial Analyst Journal 47:65-72.

Hsu J C, Kalesnik V and Myers B W (2008) Beyond Brinson and Barra performance attribution for managers with dynamic multifactor exposures.

Ippolito R A (1989) Efficiency with costly information: A study of mutual fund performance, 1965-1984. The Quarterly Journal of Business 54:1-23

Jensen M C (1968) The performance of mutual funds in the period 1945-1964. Journal of Finance 23:389-416.

Laker D (2000) What is this thing called interaction? Journal Performance Measurement 5:43-58.

Lehmann B N and Modest D M (1987) Mutual fund performance evaluation- A comparison of benchmarks and benchmarks comparisons. Journal of Finance 42:233-65.

Lu Y and Kane D (2013) Performance attribution for equity portfolios. Retrieved on 12th Sept, 2013 from http://www.rinfinance.com/agenda/2013/talk/Lu+Kane.pdf

Markowitz H (1959) Portfolio selection: Efficient diversification of investments. Pp 40-45. John Wiley and Sons, New Jersey.

Menchero J (2000) An optimized approach to linking attribution effects over time. Journal Performance Measurement 4:36-42.

Phillipe B (2005) A note on portfolio performance attribution: Taking risk into account. Journal Asset Management 5:428-37.

Sharpe W F (1966) Mutual fund performance. The Journal of Business 39:119-38.

Shukla R and Trzcinka C (1994) Persistent performance in the mutual fund market: Tests with funds and investment advisors. Review of Quantitative Finance and Accounting 4:115-35.

Singla S K and Singh P (2000) Evaluation of performance of mutual funds using risk return relationship model. Indian Journal of Commerce, Oct.

Spaulding D (2008) Should the interaction effect be allocated? A "black box" approach to interaction. Journal Performance Measurement 12:7-14.

Treynor J L (1965) How to rate management of investment funds. Harvard Business Review 43:63-75.

TSG (2007) Performance measurement attribution survey. Pp 179-182. Spaulding group, Somerset, New Jersey.

Wong C (2004) Performance measurement and evaluation: Attribution- Arithmetic or geometric? The best of both words. Journal Performance Measurement 8:10-18.